

Wallace, Kan., 0.28 in.; Boise City, Idaho, 0.30 in.; Campo, Cal., 0.31 in.; San Buenventura, Cal., 0.34 in.; Concho and Boerne, Tex., 0.40 in.

*Drought.*—Milton, Fla., 31st, very dry month, ground too dry for seed to germinate. Forsyth, Ga., 22nd, many wells have failed; water courses so low that mills are only partially able to do their work. Vail, Iowa, 31st, ground very dry. Clarksville, Tex., first half of month severe drought. Austin, Tex., 31st, most severe drought ever known here.

*Hail.*—Fort Porter, N. Y., 30th; Summit, Col., 5th; New Harmony, Ind., 5th, 6th; Vevay, Ind., 18th, 22nd, 27th, 30th; Guttenburg, Ia., 1st, 8th; Cresco, Ia., 8th, 10th; Tabor, Ia., 15th, Boonsboro, Ia., 10th, Independence, 17th; Fort Madison, Ia., 8th; Creswell, Kan., 3rd, 16th, 26th; Bowling Green, Ky., 27th; Springfield, Mass., 9th; Grand Rapids, Mich., 5th, 8th; Northport, Mich., 17th; Oregon, Mo., 6th, 16th; South Hartford, N. Y., 9th; Cape Vincent, N. Y., 29th, 31st; Margarette, Ohio, 27th; West Charlotte Vt., 31st; Leavenworth, Kan., 10th; Burlington, Ia., 8th; near Cleveland, Ohio, 18th; Newport, R. I., 31st.

*Rainy Days.*—The number of days on which snow or rain has fallen varies as follows: New England, 8 to 18; Middle States, 7 to 12; South Atlantic States, 5 to 10; Gulf States, 5 to 12th; Ohio valley and Tennessee, 9 to 15; Lower Lake Region, 12 to 18; Upper Lake Region 15 to 22; Upper Mississippi Valley, 9 to 14; Lower Missouri Valley, 6 to 13; Northwest, 9 to 13; Rocky Mountains, 0 to 10; Western Plateau, 0 to 8; Pacific Coast, 1 to 3,

*Cloudy Days.*—For New England the number varies from 8 to 14; Middle States, 5 to 10; South Atlantic States, 5 to 9; Gulf States, 4 to 20; Ohio Valley and Tennessee, 6 to 11; Lower Lake Region, 6 to 14; Upper Lake Region, 11 to 14; Upper Mississippi Valley, 3 to 12; Lower Missouri Valley, 5 to 9; extreme Northwest, 9 to 21; Rocky Mountains, 0 to 12; Western Plateau, 0 to 3; Pacific Coast, 1 to 0.

*Snow.*—5th, Kan. 6th, Md., N. H. 8th, Dak. 9th, Kan. 10th, Kan. 11th, N. M., Kan. 13th, Wy. Ty. 16th, Dak., Neb., Wy. Ty. 17th, Minn., Ind., Ia., Dak. 18th, Mich. 19th, N. Y., N. H. 20th, Wy. Ty., N. Y., Vt. Kan., N. H. 21st, Neb., Dak., Ia. 22nd, Kan., Ill. 23rd, Neb., Wy. Ty., Kan., Dak., Me. 24th, Dak., Neb., Wy. Ty., Ia., N. Y., Col., Mich. 25th, Kan., Neb., Col., Dak., Mich. 26th, Kan., Neb., Ill., Ind., Ia., Mich., Mo., Wis., Col., Dak. 27th, Dak., Ind., Ia., Mich., Minn., Ohio, Wis., Ill., Pa., N. H. 28th, Dak., Minn., Ia., Mich., N. Y., Ohio, Pa., Wis., N. H. 29th, Dak., Minn., N. Y., Ia., W. Va., Wis., Neb., Mich., Ohio. 30th, Ill., Ind., N. Y., Ohio., Wis., Ia., Mich., W. Va. 31st, N. Y., Ind., Md., Ohio, Pa., Va., W. V., Mich., Tenn., N. H. At the end of the month the depth of snow on ground was reported as follows: Cincinnati, Ohio, trace; Ringgold, Ohio, 1 inch; Pembina, Dak., 1 in.; St. Paul and Duluth, Minn., 1 in.; Marquette, Mich., 4½ in.; Escanaba, Mich., trace; Madison, Wis., ¼ in.; Chicago, Ill., ¼ in.; Grand Haven, Mich., ½ in.; Alpena, Mich., 1 in.; Cleveland Ohio, trace; Rochester, 1-5 in.; Oswego, ¼ in.; Columbus, Ohio, ½ in.; Mt. Washington, N. H., 2 in. On the 12th, the observer at New Westminster, B. C., reported the snow on mountains almost to winter-line, one month earlier than the mean for the last five years. Heavy snow fell at the base of Pike's Peak October 26th and 27th, while but little fell on the summit, where the weather has been remarkably mild and pleasant. At Summit C. P. R. R., 12.13 inches of snow fell during the month.

## RELATIVE HUMIDITY.

The average percentage of relative humidity for the month ranges as follows: New England 65 to 80; Middle Atlantic States, 62 to 77; South Atlantic States, 69 to 79; East Gulf States, 67 to 76; West Gulf States, 65 to 71; Lower Lake Region, 63 to 73; Upper Lake Region, 67 to 73; Ohio Valley and Tennessee, 59 to 71; Upper Mississippi Valley, 60 to 65; Lower Missouri Valley, 54 to 61; Red River of the North Valley, 69 to 78; Eastern Slope, from Dakota to interior of Texas, 52 to 70; Western Plateau, 24 to 54; California, 41 to 73. *High stations* report the following not corrected for altitude: Mt. Washington, 88; Virginia City 60; Cheyenne, 47; Denver, 28; Santa Fe, 23.

## WINDS.

The prevailing winds at the Signal Corps stations are shown by arrows on chart No. II, by an examination of which it will be seen that they have been northerly along the Middle and South Atlantic States; southerly in New England and from the Lower Lakes to the Southwest, and northwesterly in the Upper Lake region, the Northwest and thence westward.

*Total Movements of the Air.*—The following are the *largest* monthly movements recorded at the Signal Corps stations, viz: Cape May, 13,478 miles; Portsmouth, N. C., 12,292; Cape Lookout, 12,162; Kittyhawk, 11,841; Sandy Hook, 11,776; Thatchers' Island, 10,813; Dodge City, Kan., 10,558; Sandusky, 10,430; Cape Henry, 10,289; Barnegat, 10,152; Milwaukee, 10,150; Breckenridge, 10,115; Key West, 10,101; Grand Haven, 9,957; Fort Sill, Ind. Ty., 9,836. *The smallest* are: Visalia, Cal., 1,574 miles; Knoxville, 1,666; Lynchburg, 2,208; Augusta, 2,509; Uvalde, Tex., 2,625; Nashville, 2,764; Los Angeles, 2,869; Boise City, Idaho, 3,398; Davis, Tex., 3,463; Eagle Pass, Tex., 3,508; Montgomery, 3,636; Shreveport, 3,667; Springfield, 3,923; Fort Craig, N. M., 3,703; San Diego, Cal., 3,872.

## VERIFICATIONS.

*Indications.*—The detailed comparison of the tri-daily weather indications, with the telegraphic reports for the succeeding twenty-four hours, show the greatest percentage of omissions to be 0.4 per cent., and of

verifications to be 87.5 per cent. The percentage of verifications for the four elements have been: weather, 90.7; wind, 83.7; temperature, 88.7; barometer, 87.0. The percentage of verifications by geographical districts have been: New England, 87.6; Middle States, 88.4; South Atlantic States, 87.3; East Gulf States, 87.2; West Gulf States, 89.1; Lower Lake region, 85.3; Upper Lake region, 87.4; Tennessee and Ohio valley, 86.8; Upper Mississippi valley, 89.4; Lower Missouri valley, 86.8. Of the 3,704 predictions that have been made, 63, or 1.7 per cent., are considered to have entirely failed; 16, or 4.4 per cent., were one-fourth verified; 409, or 11.1 per cent., were one-half verified; 295, or 8.0 per cent., were three-fourth verified; 2,776, or 75.0 per cent., were fully verified, so far as can be judged from the tri-daily weather maps.

*Cautionary Signals.*—During the month, 234 Cautionary Signals were displayed; 207, or 88.4 per cent., were justified by subsequent hourly velocities of 25 miles or over at, or within 100 miles of the station.

*Cautionary Off-Shore Signals*—thirty-two signals not included in the preceding—were ordered up as Cautionary Off-Shore Signals; 25, or 78.1 per cent. of these were justified both as to velocity and direction. Sixty-two Cautionary Signals were changed to Off-Shore Signals, and as to velocity, are considered with the Cautionary,—as to direction, 58 or 84 per cent., were justified. Fifty-nine cases were reported, generally from scattered stations, of winds of 25 miles or over when signals were not ordered.

## NAVIGATION.

In the table on the right-hand of chart No. 111, are given the highest and lowest readings on the Signal Service river gauges during the month, with dates of same, from an examination of which it will be seen that the rivers have continued quite low throughout.

*Ice in Rivers.*—Floating and shore ice was reported in the Missouri and Red river of the North, from the 26th to the 29th, at Fort Rice, Bismarck and Pembina; at Morrilton, Dak., the James river was frozen over on the 27th, but on the 31st all the ice had disappeared.

*High Tides.*—Portsmouth, N. C., 3d, 4th; Tybee Island, S. C., 27th, 29th; Cape May, N. J., 23d, highest tide since 1821, all small objects swept before it; Dover, Del., 23d, highest tide known for years; Mt. Desert, Me., 24th, 28th; Flushing, N. Y., 23d, in Flushing Bay, three feet higher than usual.

## ATMOSPHERIC ELECTRICITY.

*Thunder-Storms.*—1st, Minn., Ill., Ind., Ia., Mo., Neb., Wis., Ariz., Mich. 3rd, Kan. 4th, Ill., Kan., Mo., Vt. 5th, Col., Kan., Mo. 6th, Ia., Mo. 7th, N. C., Va. 8th, Tex., Ill., Ia., Mich., Wis., Kan. 9th, N. Y., Conn., Ill., Ind., Ky., Me., Mass., Mo., N. H., N. J., Ohio, Vt., Pa. 10th, Ill., Ia., Kan., Mo., Neb., Wis. 11th, Ind., Ky. 12th, Ia., Wis. 13th, Ill., Ia., Mo., Ohio. 14th, Ia., Mich., Ohio, Wis. 15th, Dak., Me., Mich., Minn., Ill., Ia., Kan., Mo., Neb., N. Y., Wis. 16th, Ill., Ia., Kan., Mich., Mo., N. Y., Wis. 18th, Ia., Va. 22nd, Va. 23rd, Va. 25th, Ind. 26th, Ill. 27th, N. J. 30th, Tenn., Va.

*Anroras.*—Bismarck, Dak., 21st; Madison, Wis., 25th; Escanaba, Mich., 19th; Eastport, Me., 21st; Ft. Wayne, Ind., 12th, 31st; Nora Springs, Ia., 16th; Cape Vincent, N. Y. 22nd; Garrettsville, Ohio, 11th; Woodstock, Vt., 28th; Manitowoc, Wis., 19th.

*Telegraphic Communication Interfered with by Atmospheric Electricity.*—Boerne and McKavitt, Tex., 8th.

## OPTICAL PHENOMENA.

*Solar Halos.*—1st, Ill.; 2d, N. Y., Md., Ohio; 3d, Cal., Iowa; 4th, Ohio, R. I., Conn.; 5th, R. I.; 6th, Iowa; 7th, Conn., Ill., Ind., Iowa, Md., N. J., N. Y., Ohio, Vt., Md., Dak., Ga., R. I.; 8th, Conn., Ind, Me., N. Y., Ohio, Md., Dak., Ga., R. I.; 9th, Ky., Mass., Md., Fla., S. C., Ga.; 10th, Ind., Ohio, Md., N. C.; 11th, Conn., Me., Miss., N. J., N. Y., Ohio, R. I.; 12th, Ind., Iowa; 13th, Ind., N. Y., Ohio, Md.; 16th, N. Y., Vt., Md., N. C., S. C., R. I.; 17th, Conn., N. J., N. Y., R. I.; 20th, Md.; 22d, N. H., N. J.; 25th, N. Y., Ohio; 26th, N. J., N. Y., Pa.; 27th, N. Y., Pa.; 29th, Ind., N. Y., Ohio; 30th, Md.

*Lunar Halos.*—1st, N. Y. 2nd, Dak. 3rd, Ill. 4th, Iowa, Mass., Vt., R. I. 5th, Ga., Ill., Ky., Miss., Vt., Neb. 6th, Ill., Ky., Mich., Miss., N. Y., Vt., Neb., Mo., Ohio. 7th, Fla., Ind., Maine, Mass., Ohio, Neb., Ill., Conn. 8th, Conn., Fla., Maine, Mass., Ohio, Vt., Tex., Fla., Ill., S. C., Ga., N. J., R. I. 9th, Conn., N. C., Vt., Md., Neb., Fla., Mich., N. Y., Ohio, S. C., Ga., Pa., Mass. 10th, Ill., Ind., Iowa, Md., Mo., N. J., N. Y., N. C., Ohio, Pa., Vt., Md., N. H., Conn., Maine. 11th, Maine, Ohio, N. Y. 12th, Ill., Iowa, Wis., Neb., Mo., Pa. 13th, Conn., Ind., Iowa, Mass., N. Y., Ohio, Vt., R. I. 14th, Conn., Maine. 15th, Iowa, N. Y., Maine. 16th, Ind., Iowa, Maine. 17th, N. Y., Ill. 21st, N. Y. 22nd, Md., Maine. 24th, N. Y. 28th, Ind. 29th, Me. 30th, Neb. 31st, N. J., Wis.

*Mirage.*—Burlington, Vt., 20th; New London, Conn., 2nd, 3rd, 5th, 6th, 7th, 25th, 28th, 29th.

## MISCELLANEOUS PHENOMENA.

**BOTANICAL.**—*Maine*—Cornish, 14th, forest foliage changed color; 10th, field strawberries and dandelions in bloom since the middle of last month, and some ripe fruit. *Massachusetts*—Somerset, 1st to 10th, harvesting corn. Fall River, in bloom, 21st, pear and some forest trees; 26th, trailing or butus in full bud. Westboro, 1st to 29th, flowers blooming in field and garden. Waltham, 7th to 25th, forest leaves falling rapidly, 26th, almost stripped of leaves. *Michigan*—Northport, 31st, fall crops, corn, potatoes and buckwheat